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ABSTRACT

Some studies of early readers are discussed. It is pointed out that study of early readers has relevance for practical and theoretical issues in psychology and education. Of interest in this document are the following questions: (1) Are there any special talents or traits distinguishing early from non-early readers? (2) Do children who read early on their own differ from those who read early because of adult intervention? (3) Is there such a thing as "reading readiness"? (4) What sort of parent-child experiences are more common in families of early readers than of non-early readers? (5) To what extent does early reading relate to such variables as birth order, family size, parent education and so on? Studies discussed include the Durkin study. A pilot study was conducted in which children were matched for age, sex, IQ scores and socioeconomic status. T-tests for matched pairs were done for each of the variables in the study. Separate analysis of parent interview data was done using the non-parametric Wilcoxen's Matched Pairs Signed Ranks Tests. Results are inconclusive. (CK)

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Cognitive Development in Early Readers

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In the broadest sense, reading can be regarded as an elaborate set of perceptual and cognitive skills which make possible the recognition, comprehension and interpretation of language symbols. Because reading involves so many interrelated mental activities, it can be studied from many different perspectives and in relation to a host of different variables and conditions. Indeed, reading may well be the most extensively studied topic in educational psychology and i has been estimated (Chall, 1967) that more than one thousand studies of reading are conducted each year.

The study of early readers seems to have considerable relevance for a number of practical as well as theoretical issues in psychology and in education. Some of the questions we are interested in follow. 1) Are there any special abilities, talents, or personality traits which distinguish early readers from non-early readers? 2) Do children who read early on their own with relatively little adult intervention, differ from children who were taught to read at an early age in such things as achievement, personality, and social adjustment? 3) Is there such a thing as "reading readiness" in the sense of there being some crucial abilities which are necessary, if not sufficient, for children to learn to read? 4) What sort of parent-child experiences are more common in families of early readers than of non-early readers? 5) To what extent does early reading relate to such variables as birth order, family size, parent education and so on? Answers to any and all of these questions would help us to understand better the complex of factors that enter into successful reading experience.

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Although the study of early readers would seem to be a fruitful approach to answering some of the questions raised above, few such studies appear in the literature. The most intensive and carefully conducted of these investigations

were two carried out by Dolores Durkin and reported in her book, Children Who Read Early (1966). Durkin carried out one study in Oakland, California and another in New York City. In each project she surveyed several thousand first graders to obtain her sample of early readers. The children were then given intelligence and achievement tests. A small sub-sample of parents were interviewed intensively in the New York study. School achievement data, intelligence test scores and some parent interviews thus made up the bulk of Durkin's analysis. In each study she followed the early readers for at least part of their elementary school careers.

Among the many interesting results reported by Durkin was the finding of an inverse relationship between the maintenance of reading advantage and IQ score. That is to say, early readers of average intellectual ability continued to read at significantly higher levels than non-early readers of comparable ability, throughout the elementary school grades. Early readers of better than average intelligence, however, did not maintain their reading advantage over peers of comparable intellectual power. Also of interest were her findings of essentially no differences between her early readers and a control group of non-early readers on the Bender Visual Motor Gestalt Test, Minnesota Tests of Creative Thinking and on a Teacher Rating Scale. These results led Durkin to comment on the many similarities that existed in the two groups of children.

While these findings are suggestive, they suffer from a number of difficulties that Durkin was careful to point out. One of these had to do with control groups. Durkin used several different techniques for selecting the comparison children, none of which she (or we) considered even close to being ideal.

In the California study she attempted to use children who had spent their school years in the same school as the early readers, had not been retained

or double promoted, and had been given Stanford-Binets by the school district. In the New York study, 30 of the total identified group of 156 first grade early readers were randomly selected for special, more intens ve study. From their classrooms, teachers were asked to select children of the same sex as the early reader who obtained almost the same score as the readers on a group intelligence test. These potential controls were then given the Binet (as had been the early readers) and subjects were rematched by Binet IQ scores in pairs. However, this matching ruined the attempt to match by sex. Both of these procedures have serious flaws which Durkin recognized very clearly. To attempt a more fine-grained analysis of various cognitive and perceptual skills, as well as the personality and social characteristics distinguishing early reading children from others, more careful matching by sex and intelligence test scores (especially verbal ones) must be attempted.

The focus of Durkin's work was on the reading achievement of children who started to read before the first grade and on the differences in preschool years existing for early readers and controls. In addition, her second study attempted to look at certain personality characteristics to see if they might differentiate the two groups. Accordingly, measures of creativity, visual motor perception and a teacher rating scale were taken. As previously mentioned, these did not distinguish readers from their controls. These measures are both few in number and clearly warrant analysis on other populations before conclusions of "no differences" can be more firmly established. More questions need to be asked about the nature of personality, perceptual and cognitive abilities of early readers including information on self-concept, need for achievement, social adjustment and fine motor skills. For the most part, these are areas where the data is either unclear or nonexistent.

Compared to the Durkin studies, other research appears to be fragmentary and less conclusive. A recent study of King and Friesen (1972)

matched early readers with a randomly selected group of non-readers. These investigators reported that the early readers came from families that were smaller and at a higher socio-economic level than non-readers. Mothers of early readers had more education than the mothers of non-early readers. The early readers themselves were brighter and engaged in more sedentary activities than did their non-reading peers.

While these findings are of interest, they leave many more detailed questions unanswered. For example, the findings do not speak to differences between early readers and non-early readers of comparable intellectual ability, social class and family size. Put differently, once the advantages the early readers share with non-readers are controlled for, what characteristics still differentiate them from their matched peers?

Answers to these and previously raised questions would seem to be of great practical importance. But beyond these very important issues are ones of theoretical interest in developing our understanding of reading and the skills which may be necessary, if not sufficient, for it to occur. Elkind has been intensively involved in Piagetian perceptual and cognitive research for more than ten years. Out of this experience the hypothesis has developed that learning to read English requires (as a necessary but not sufficient condition) the logical abilities Piaget calls concrete operations.

Briefly stated, Piaget's perceptual theory (1969) assumes that perception develops in a discernible fashion that is related to age. In infants and young children, perception is <u>centered</u> in the sense that it is caught and held by the dominant aspects of the visual field. In each case the dominant aspects of the field are determined by Gestalt-like principles of closure, continuity, good form and so on that Piaget calls <u>field effects</u>. With increasing age, however,

and the development of new logic-like perceptual abilities, that Piaget calls perceptual regulations, perception is gradually decentered in the sense that it is progressively freed from its earlier domination by the field aspects.

Problems requiring figure-ground reversal (Elkind & Scott, 1962), schematization or part-whole integration (Elkind, Koegler & Go, 1964), exploration (Elkind & Weiss, 1967), transport or size judgements at varying distances (Farkas & Elkind, 1973), and temporal decentration (Meyer & Elkind, 1973) have been presented to children. In all of these diverse problems young children tend to center upon the dominant features of the field and this centration diminishes with increasing age.

To determine whether these factors were indeed related to reading, several studies were undertaken. The results were consistent in showing a strong, positive relationship between performance on the measures of perceptual decentration and reading. In one study children were given a large battery of perceptual decentration measures as well as standard reading achievement tests. Factor analysis of the data revealed a major decentration factor common to the reading and perceptual measures (Elkind, Horn & Schneider, 1965). In another study, slow and average readers, matched for intelligence, were tested on the perceptual decentration measures, given perceptual training and then retested. Slow readers did more poorly initially and profited less from the training than did average readers of comparable intelligence (Elkind, Larson & Van Doorninck, 1965).

One implication of this decentration hypothesis regarding beginning reading is that instruction in regulational activities might facilitate the acquisition of some reading skills. To test this notion, Elkind and students first demonstrated that instruction could be of benefit to children in their solution

of perceptual tasks (Elkind, Koegler & Go, 1962). Then they attacked the problem more directly and worked an entire semester with second grade ghetto children (Elkind and Deblinger, 1969). The control group was instructed with the Bank Street Readers while the experimental group were taught with a number of non-verbal exercises designed to give children practice in perceptual regulations. Results showed that the children in the experimental group did significantly better in word-form and word recognition than the control group, and equally well in comprehension. It was suggested that such exercises, which require nothing more than chalk and a blackboard, might be useful to teachers as an additional teaching aid.

For early readers, decentration theory predicts that they should be superior to non-readers of equal intelligence with respect to their possession of perceptual regulations and concrete operations. A goodly number of studies (for a review of these cf Elkind, 1969) have shown that performance on Piagetian tasks correlate about .35 to .40 with intelligence test measures. There is thus no one to one correspondence between operativity and tested intelligence. Our prediction is that in the case of early readers, the discrepancy between the mental age suggested by the IQ scores and that suggested by the Piagetian tests will be greatest for children scoring in the average range on the intelligence test.

Pilot Study I

By means of advertising in local papers, putting up cards on bulletin boards and even some door bell ringing, a sample of sixteen early readers and a like number of matched controls was obtained for a pilot study during the spring and summer of 1972. The children were matched for age, sex, IQ scores and socio-economic status. All testing was done at the University of Rochester Child Development House to which the children were brought by either

parents or staff. The test battery included measures thought to represent the various cognitive, perceptual and personality abilities that have been mentioned in the literature that relate to reading. Some of the tests have been developed at the University of Rochester, either in connection with the research on perceptual development or in connection with the longitudinal evaluation of the World of Inquiry School. (This is an experimental "open" concept school sponsored by the Rochester City School District.) In addition to the rather extensive test battery, semi-structured parent interviews were conducted with one or both parents of each reading and non-reading child.

Analysis

Initially, t-tests for matched pairs were done for each of the variables in the study. Since there were more than 25 such measures, consideration had to be given to what number of them would have been found to be significantly different for readers and controls by chance. Because of the small sample size and the large number of variables tested, there is great redundancy in the data and it is not independent. The degree to which these variables correlate with each other is unknown and it is, therefore, impossible to say with any certainty how many would have reached significance by chance.

To help to clarify which of our significant t-tests might be particularly worthy of further study, a factor analysis was conducted on all the data. This was also done to reduce the number of variables we were considering without the loss of data. Children were then assigned factor scores derived from the factor loadings and their scores on the tests. A discriminant analysis was then run on the two groups, first testing the overall hypothesis of difference between groups, then the hypotheses of differences for each of the five factors.

Separate analysis of the parent interview data was done using the non-parametric Wilcoxen's Matched Pairs Signed Ranks Test.

Results

Of the approximately 25 t-tests run, eight of them reached significance at the .05 level or better. They included the accuracy score on the reflection-impulsivity measure ($t = 3.15$, $p < .01$) Our readers were more accurate than our control subjects, although their time scores did not distinguish them. Separate t-tests were done for the six individual items plus the total score on the Concept Assessment Test (conservation). All mean differences favored the readers on conservation - two significant at the .01 level, two at the .05 level, 2 approaching significance at the .05 level and one which was only directionally appropriate (see Table 1).

The P.A.T. (ambiguous pictures) also yielded differences significant at the .05 level as did one of our subtests on the creativity measure. Interestingly, we had one significant difference ($t = -2.21$, $p < .05$) which represented a reversal of expectation. Our controls had better scores on the Koppitz Developmental scoring for the Bender.

Factor analysis yielded five factors which accounted for most of the observed variability. The overall test of difference in the data by factors yielded a p value of .17. Because of our a priori hypothesis regarding the role of operativity in reading, we ran significance tests despite the nonsignificant overall F. When significance tests were run on subjects' factor scores there was one significant F. This was for the "operativity" factor upon which all of the conservation tasks and the Kagan reflection-impulsivity task loaded heavily. The other which approached significance ($p < .13$) could be called a "perceptual integration" factor. Some of the decentration measures and several of the Rorschach scores (number of whole responses and the ratio of whole to detail

responses) showed heavy loadings. Examination of individual pairs of experimental and control children's scores showed that in six of eight cases, children of average intellectual ability (IQ scores of one member of the pair less than 110) were superior to their matched controls on the conservation tasks.

As in other studies, analysis of parent interviews showed that mothers of early readers had more education and were at a higher occupational level than the mothers of non-readers. Other interesting results were that the fathers of early readers read to their children significantly more often than did the fathers of non-early readers. Early readers watched "Electric Company" significantly more often and for longer periods than did non-readers, although both readers and controls watched "Sesame Street" approximately equally. A number of early readers were also taught or read to by an older sibling or friend who had a close and continuing relation with the child.

Discussion

Clearly our most interesting and impressive finding from both statistical analyses is the existence of a strong "operativity" factor. This is primarily represented by our measures of conservation, but is also contributed to by the measure of reflection impulsivity.

Since this report is based on pilot data, we are reluctant to make strong statements about the implications of this finding. Suffice it to say, that it does provide support for the decentration hypothesis and is leading us to inquire actively for further data on this theoretical notion.

If operativity should continue to seem to be an important condition for learning to read English, it carries implications for appropriate timing for beginning reading instruction, suggestions for promoting readiness, and

possibly instructional clues as to the most appropriate method for a given individual at a particular time in his development.

Another major interest in this study is the role of cognitive style (reflection-impulsivity) in the development of early reading. Accordingly, we are continuing our investigations of this variable and how it contributes to and/or interacts with other things relating to early reading.

To conclude, we are also greatly interested in the results of our parent interviews. Information on the possible roles of Sesame Street (none?) and Electric Company (maybe some?) in children's early reading should be forthcoming. Also tantalizing is the difference in our pilot data which suggests fathers may be more actively involved with their children in reading related ways for our early reading group.

Plans

During the current academic year we are again following procedures similar to the ones described here. This year our sample includes approximately 40 kindergarten early readers and their matched controls. In the 1973-74 school year we hope to identify and study about 50 more such pairs of children and to follow them in a longitudinal study over a period of from three to six years.

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Table 1

Means and Significant t-Tests for Early Readers and Non-early Reader Controls

(Total number of t-tests run: 27)

Variable		No. of Cases	Mean	Mean Difference	t value
# of responses to correct	C	16	1.2197	0.1384	3.15 **
	R	16	1.0813		
Conservation					
1) 2-dimensional space	C	16	0.3125	- 0.4375	- 2.41 *
	R	16	0.7500		
2) number	C	16	0.5000	- 0.3750	- 3.00 **
	R	16	0.8750		
3) substance	C	16	0.1875	- 0.5625	- 3.58 **
Total Conservation	C	16	1.7500	- 2.3750	- 2.47 *
	R	16	4.1250		
P.A.T.	C	16	7.5313	- 2.2813	- 2.54 *
	R	16	9.8125		
Bender (Koppitz Developmental Score)	C	15	5. 000	- 0.7500	- 2.21 *
	R	15	6.4500		
Creativity: Part C	C	15	2.0667	- 4.5333	- 2.19 *
	R	15	6.6000		

* equals $p < .05$
** equals $p < .01$

Test Battery for
Early Reading Children and for Non-Early Reading Controls

TEST BATTERY (planned for fall 1973)

- Durkin Screening Test
- *Wechsler Preschool and Primary Scale of Intelligence (Peabody Picture Vocabulary Test used in pilot studies)
- Gates-McGinitie (vocabulary and comprehension)
- Decentration Measures
  1) Reading words upside down
  2) Reading run together sentences
  3) Picture Integration Test (P.I.T.)
  4) Picture Exploration Test (P.E.T.)
  5) Picture Ambiguity Test (P.A.T.)
  * 6) Picture Uniformity Test (P.U.T.)
- Creativity Test (University of Rochester)
- Bender Gestalt Test (Koppitz Scoring)
- Draw A Diamond
- Kansas Reflection-Impulsivity Scale for Preschoolers (KRISP)
- Draw-A-Person Test
- Self Concept Test (University of Rochester)
- Child's Conception of Reading Inventory (University of Rochester)
- Concept Assessment Kit (Goldschmid-Bentler)
  a) two-dimensional space
  b) number
  c) substance
  d) continuous quality
  e) weight
  f) discontinuous quantity
- Illinois Test of Psycholinguistic Abilities
  a) Auditory Reception
  b) Auditory Association
  c) Auditory Memory
  d) Grammatical Closure
  e) Sound Blending
  f) Auditory Closure
- Parent Interview
- *Child's Attitude Towards School (University of Rochester)
- *Sociogram
- *Teacher Ratings

* Measures not used in second pilot study (1972-73)

Deleted after first pilot study:

- Lincoln-Oseretsky
- Rorschach
- Writing Test (scored for fine motor control)